CLAIMS

1. (original) A method for nitrogen oxide (NO_x) reduction in an oxygen rich engine exhaust comprising the steps of:

a) passing an oxygen rich exhaust through a non-thermal plasma (26) thereby converting nitrogen oxide (NO) and hydrocarbons in the oxygen rich exhaust into nitrogen dioxide (NO_2) and oxidized hydrocarbons and forming an intermediate exhaust;

b) passing the intermediate exhaust over at least one metal doped Y-alumina, wherein the Y-alumina has a pore volume of at least 1.0 cubic centimeters per gram, thereby converting the NO_2 to nitrogen (N_2).

2. (original) A method as claimed in Claim 1, wherein step a) comprises the further step of injecting an amount of at least one atomized hydrocarbon (24) into the oxygen rich exhaust prior to passing the oxygen rich exhaust through the non-thermal plasma (26).

3. (original) A method as recited in Claim 1, wherein step a) further comprises passing an oxygen rich exhaust having an oxygen content of equal to or greater than 4% through the non-thermal plasma (26).

4. (currently amended) A method as recited in Claim 1, wherein step b) further comprises a step of selecting the metal for doping of the Y-alumina from the group consisting of indium, tin, gallium, silver, gold, copper, cobalt, iron, cerium, and mixtures thereof<u>; and</u>

<u>the Y-alumina has a surface area of at least 200 square meters per gram.</u>

5. (original) A method as recited in Claim 1, wherein step b) comprises a further step of doping the Y-alumina with the metal by incorporating the metal into water used for a gelation step as part of a sol gel method for formation of the Y-alumina.

6. (original) A method as recited in Claim 1, wherein step b) comprises a further step of doping the Y-alumina with the metal by bringing the Y-alumina into contact with a solution of the metal wherein the solution of the metal is present in an amount equal to or greater than the total pore volume of the Y-alumina.

7. (original) A method as recited in Claim 1, wherein step b) comprises a further step of doping the Y-alumina with from about 1 weight percent to about 10 weight percent indium.

8. (original) A method as recited in Claim 1, wherein step b) comprises a further step of doping the Y-alumina with from about 1 weight percent to about 20 weight percent tin.

9. (original) A method as recited in Claim 1, wherein step b) comprises a further step of doping the Y-alumina with from about 1 weight percent to about 55 weight percent gallium.

10. (currently amended) A method as recited in Claim 1, wherein step b) comprises a further step of preparing the Y-alumina by a sol gel method <u>with at least one of a complexing agent and proponol wash</u>.

11. (original) A method as recited in Claim 1, wherein step a) further comprises a step of passing a diesel exhaust through the non-thermal plasma (26) thereby converting the nitrogen oxide (NO) and hydrocarbons in the diesel exhaust into nitrogen dioxide (NO_2) and oxidized hydrocarbons and forming an intermediate exhaust.

12. (original) An exhaust treatment system for nitrogen oxide reduction in lean burn engines comprising:

a non-thermal plasma (26) in an exhaust system that is adapted to receive an oxygen rich exhaust, said non-thermal plasma (26) converting the nitrogen oxide (NO) and hydrocarbons in said oxygen rich exhaust into nitrogen dioxide (NO_2) and oxidized hydrocarbons;

a catalytic unit (28) operably connected to said non-thermal plasma (26) and adapted to receive said oxygen rich exhaust after said non-thermal plasma (26), said catalytic unit (28) comprising at least one metal doped Y-alumina, wherein said Y-alumina has a pore volume of at least 1.0 cubic centimeters per gram and said metal comprises indium, tin, gallium, silver, gold, copper, cobalt, iron, cerium, or mixtures thereof.

13. (original) A system as recited in Claim 12, wherein said Y-alumina is doped with from about 1 weight percent to about 10 weight percent indium.

14. (original) A system as recited in Claim 12, wherein said Y-alumina is doped with from about 1 weight percent to about 20 weight percent tin.

15. (original) A system as recited in Claim 12, wherein said Y-alumina is doped with from about 1 weight percent to about 55 weight percent gallium.

16. (original) A system as recited in Claim 12, wherein said Y-alumina has a pore volume of from 1.0 to 2.0 cubic centimeters per gram.

17. (currently amended) A system as recited in Claim 12, wherein said Y-alumina ~~has a sulfate content of less than or equal to 0.1 weight percent.~~ <u>being sulfate-free.</u>

18. (original) A system as recited in Claim 12, wherein said Y-alumina is doped with a metal comprising either 2.5 weight percent indium, 10 weight percent tin, or 50 weight percent gallium.

19. (original) A system as recited in Claim 12, wherein said Y-alumina has a surface area of at least 200 meters squared per gram.

20. (original) A system as recited in Claim 12, wherein said Y-alumina is doped with mixtures of metals comprising indium, tin, and gallium.